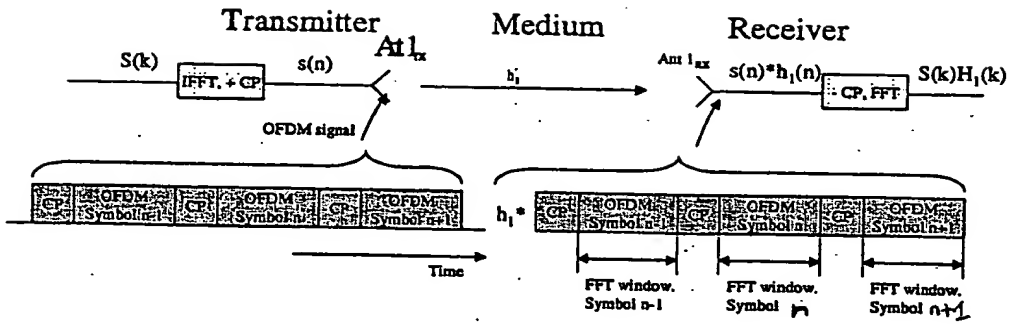

Transmitter
Medium
Receiver
S(k)
IFFT. + CP
s(n)
At1tx
h1
Am 1ax
s(n)*h1(n)
CP. FFT
S(k)H1(k)
OFDM signal
CP
OFDM Symbol n-1
OFDM Symbol n
OFDM Symbol n+1
Time
h1*
FFT window. Symbol n-1
FFT window. Symbol n
FFT window. Symbol n+1

Fig 1

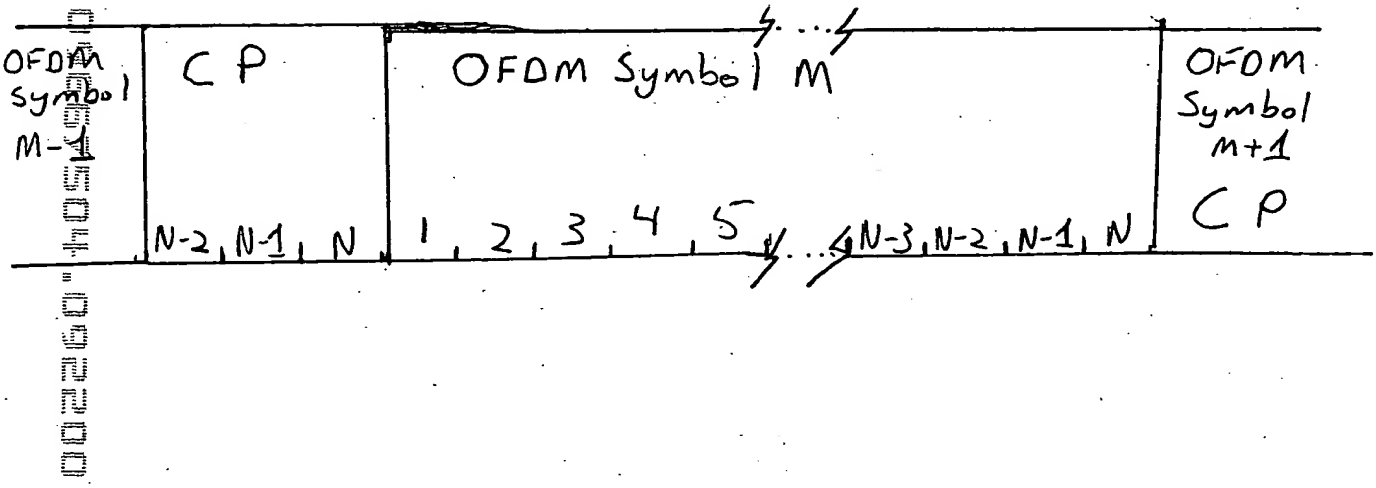

OFDM symbol M-1
CP
OFDM Symbol M
OFDM Symbol M+1
CP
N-2, N-1, N
1, 2, 3, 4, 5, ... N-3, N-2, N-1, N

Fig 2

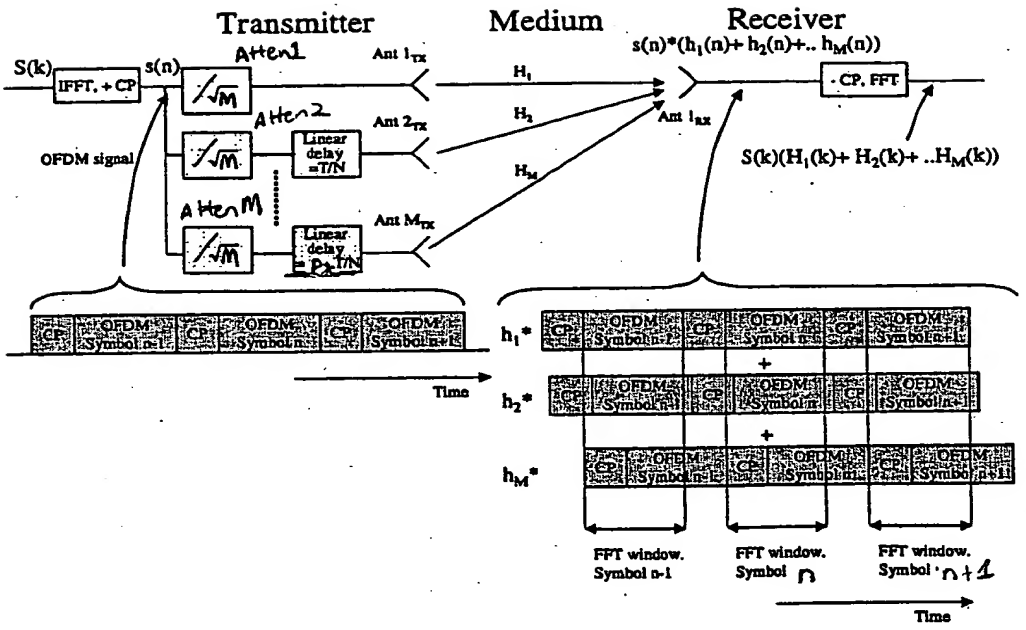

Transmitter
Medium
Receiver
S(k)
IFFT. + CP
s(n)
Atten1
Ant 1TX
H1
s(n)*(h1(n)+ h2(n)+.. hM(n))
CP. FFT
Atten2
Ant 2TX
H2
Ant 1RX
OFDM signal
Linear delay =T/N
S(k)(H1(k)+ H2(k)+ ..HM(k))
AttenM
Ant MTX
HM
Linear delay = PM T/N
CP
OFDM Symbol n-1
OFDM Symbol n
OFDM Symbol n+1
Time
h1*
h2*
hM*
FFT window. Symbol n-1
FFT window. Symbol n
FFT window. Symbol n+1
Time

Fig 3

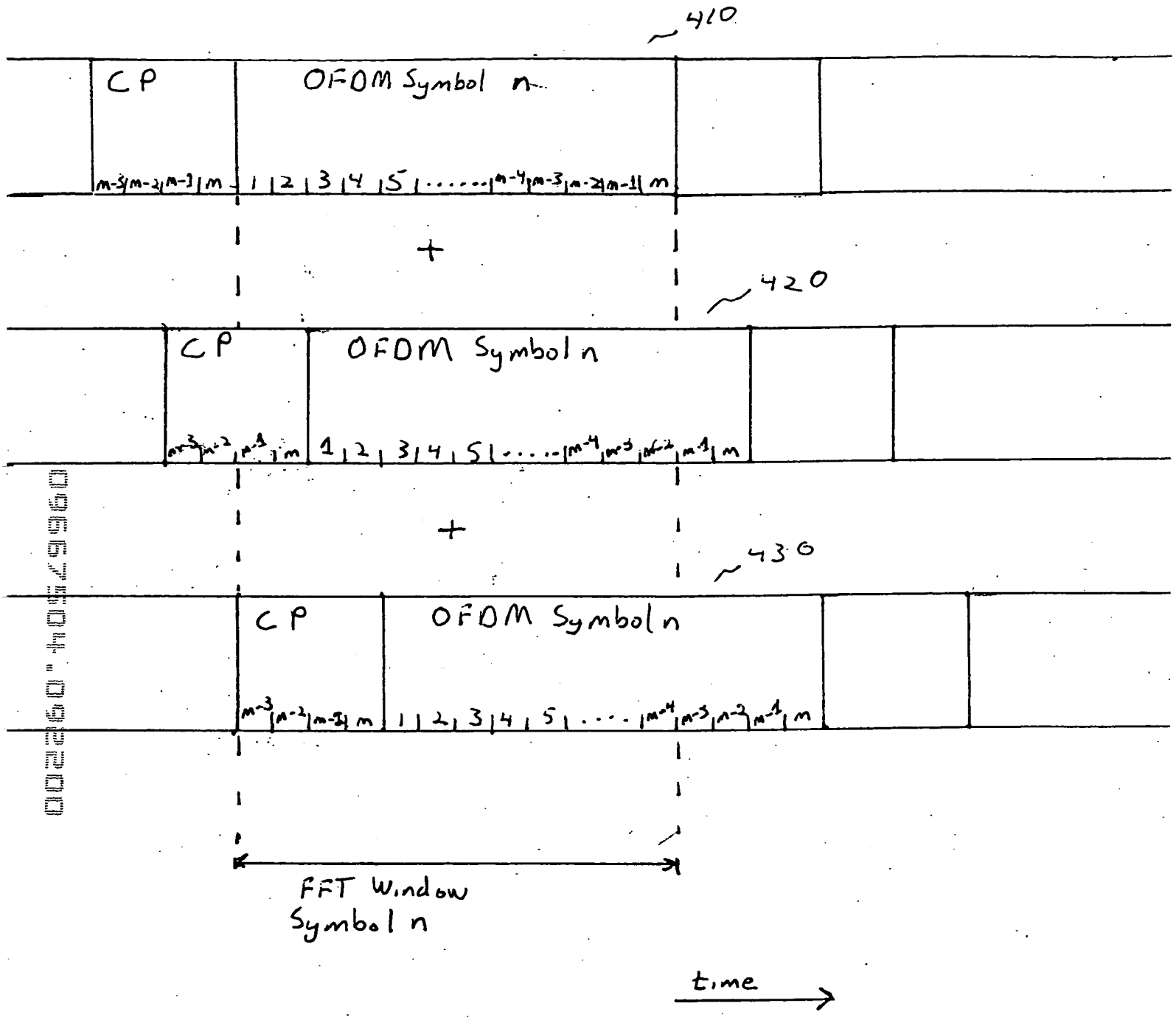

410
CP
OFDM Symbol n
m-3 m-2 m-1 m 1 2 3 4 5 ..... m-4 m-3 m-2 m-1 m
+
420
CP
OFDM Symbol n
m-3 m-2 m-1 m 1 2 3 4 5 ..... m-4 m-3 m-2 m-1 m
+
430
CP
OFDM Symbol n
m-3 m-2 m-1 m 1 2 3 4 5 ..... m-4 m-3 m-2 m-1 m
FFT Window
Symbol n
time

Fig 4

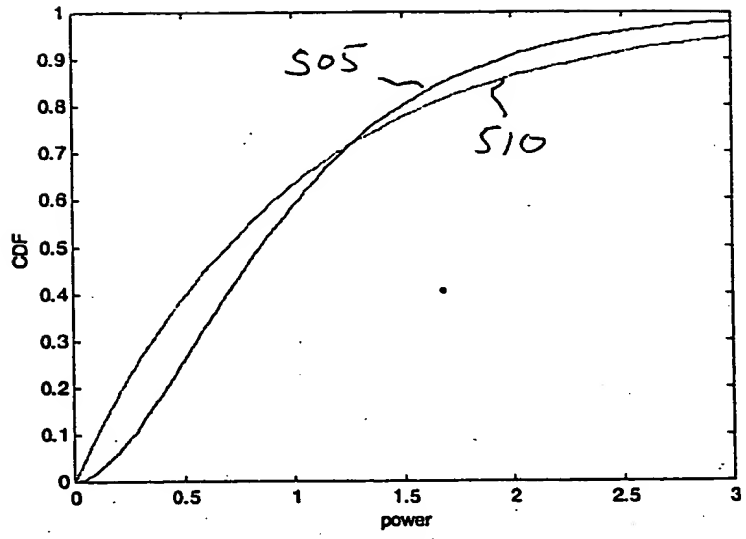


Fig 5

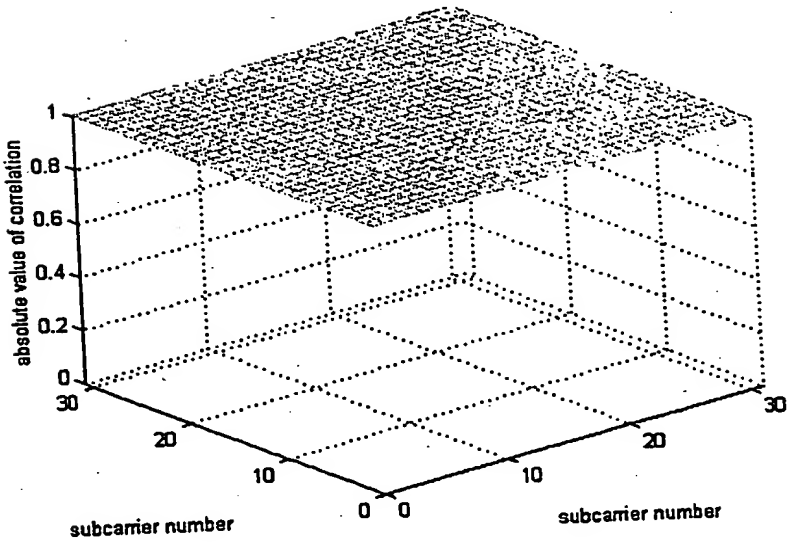


Fig 6

0020050404A1

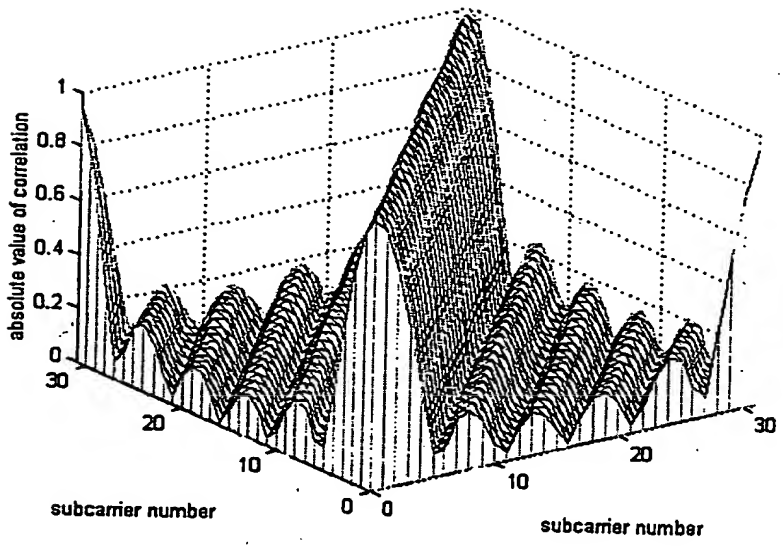

absolute value of correlation
1
0.8
0.6
0.4
0.2
0
30
20
10
0
subcarrier number
0
10
20
30
subcarrier number

Fig 7

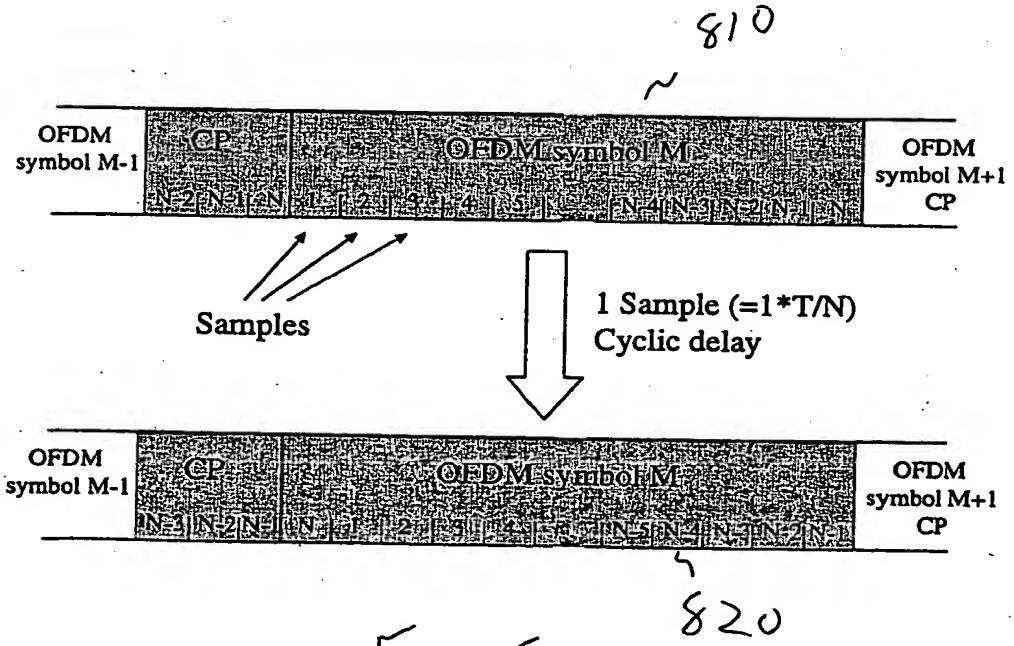

810
OFDM symbol M-1
CP
OFDM symbol M
OFDM symbol M+1 CP
Samples
1 Sample (=1*T/N) Cyclic delay
OFDM symbol M-1
CP
OFDM symbol M
OFDM symbol M+1 CP
820

Fig 8

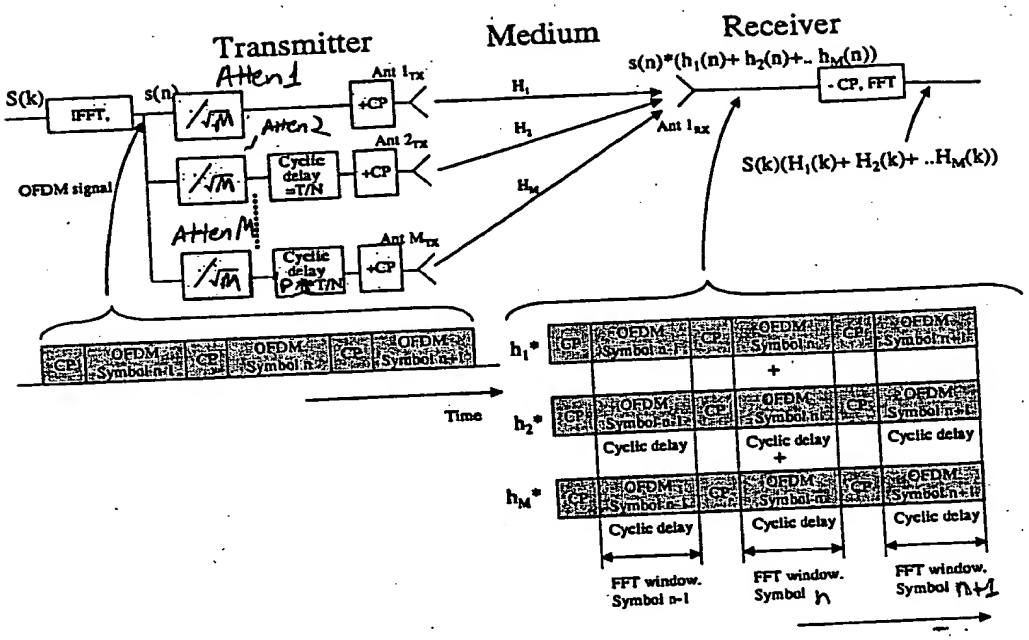

Transmitter
Medium
Receiver
S(k)
IFFT.
s(n)
Atten 1
Atten 2
Atten M
Ant 1TX
Ant 2TX
Ant MTX
+CP
Cyclic delay =T/N
OFDM signal
H1
H2
HM
Ant 1RX
s(n)*(h1(n)+ h2(n)+.. hM(n))
- CP, FFT
S(k)(H1(k)+ H2(k)+ ..HM(k))
CP
OFDM Symbol n-1
OFDM Symbol n
OFDM Symbol n+1
Time
h1*
h2*
hM*
Cyclic delay
+
FFT window. Symbol n-1
FFT window. Symbol n
FFT window. Symbol n+1

Fig 9

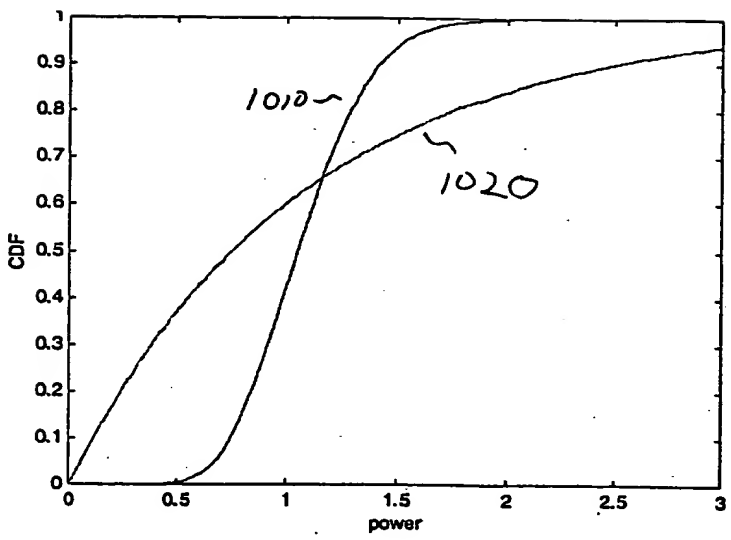


Fig 10

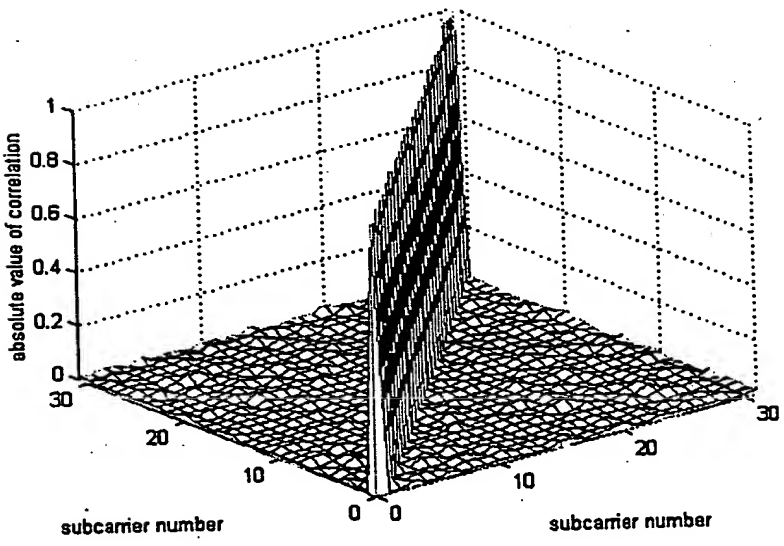


Fig 11

09697504 - 092200

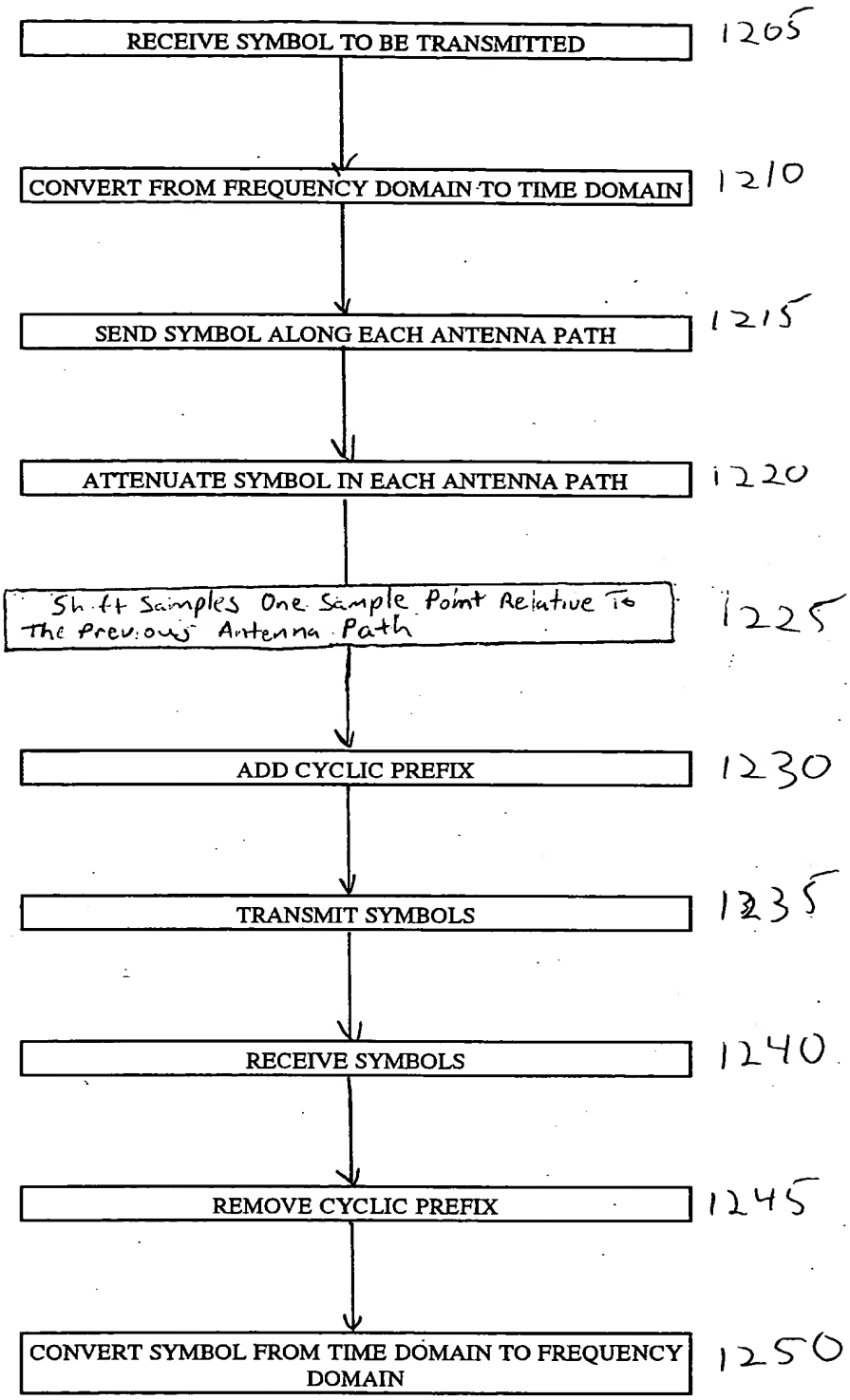
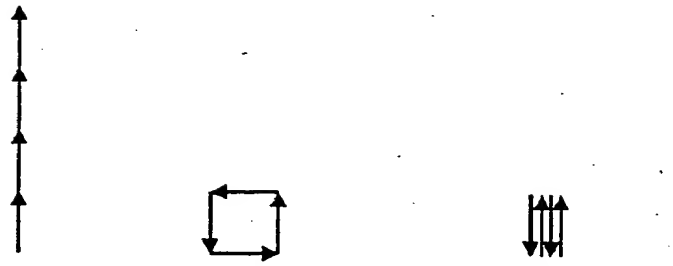

RECEIVE SYMBOL TO BE TRANSMITTED
1205
CONVERT FROM FREQUENCY DOMAIN TO TIME DOMAIN
1210
SEND SYMBOL ALONG EACH ANTENNA PATH
1215
ATTENUATE SYMBOL IN EACH ANTENNA PATH
1220
Shift Samples One Sample Point Relative To The Previous Antenna Path
1225
ADD CYCLIC PREFIX
1230
TRANSMIT SYMBOLS
1235
RECEIVE SYMBOLS
1240
REMOVE CYCLIC PREFIX
1245
CONVERT SYMBOL FROM TIME DOMAIN TO FREQUENCY DOMAIN
1250

FIG 12



ρ=1
k-k'=0
Fig 13A

ρ=0
k-k'=N/4
⇒ $t_1=1, t_2=2, t_3=3$
Fig 13B

ρ=0
k-k'=N/2
Fig 13C

Fig 13

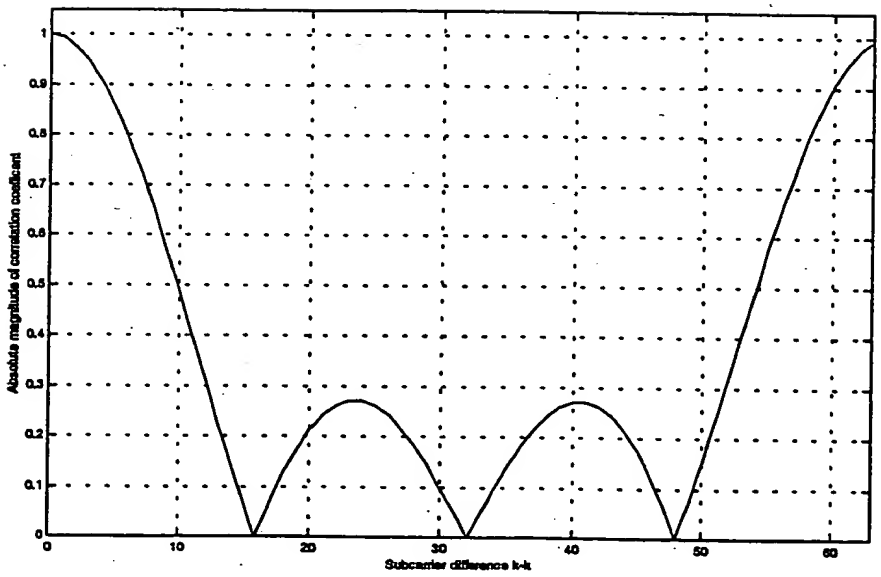


Fig 14

0956504 050200

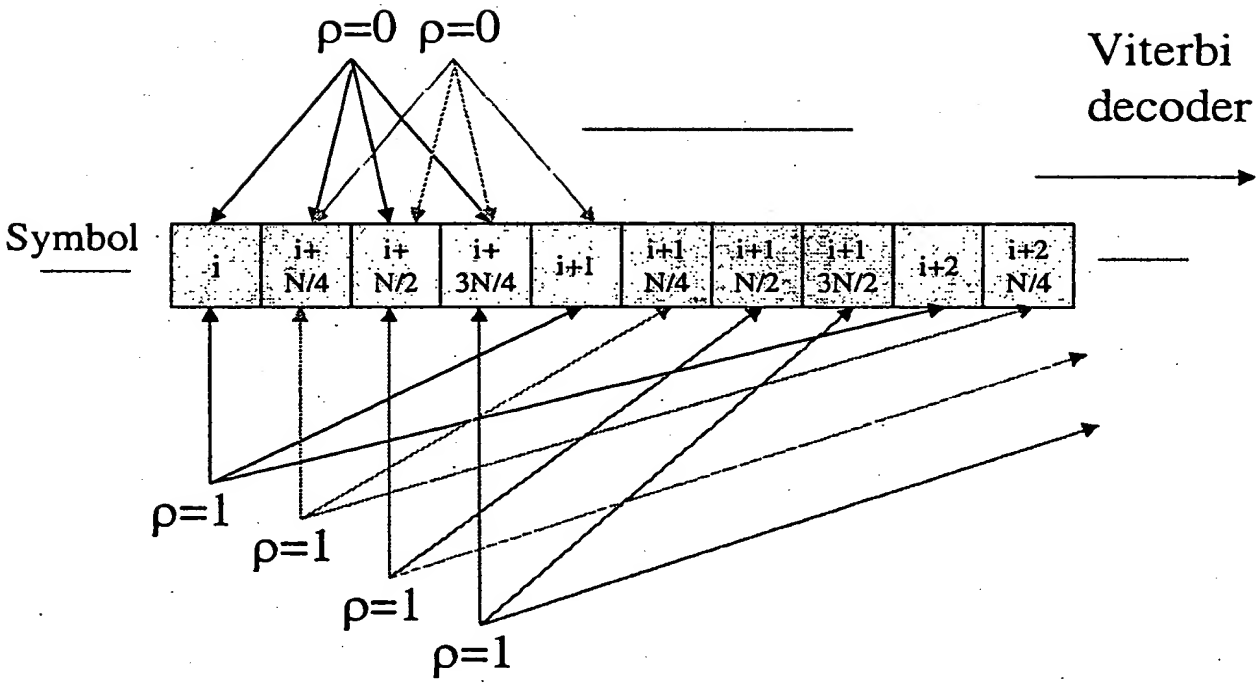


Fig 15